ABSTRACT

An image of an object is synergistically reconstructed using two or multiple imaging modalities. A first reconstructed image, showing structural information of the

5   object is produced using a first imaging modality. The first reconstructed image is segmented, and known optical properties of the object are then mapped to the first reconstructed image. Optical signal emissions from the object are detected and registered with the first reconstructed image. A second reconstructed image volume is then produced using a second imaging modality, based on the mapped optical

10   properties after registration between the first image and the data from the second modality. The second reconstructed image depicts some optical property, such as a bioluminescent source distribution, or optical properties, such as, attenuation and scattering properties, of the object.